

best means of securing definite areas for the preservation of types of British vegetation—Prof. F. E. Weiss.

The investigation of the vegetation of Ditcham Park, Hampshire—Mr. A. G. Tansley.

To take notice of, and report upon changes in, regulations—whether legislative, administrative, or made by local authorities—affecting secondary and higher education—Prof. H. E. Armstrong.

The aims and limits of examinations—Prof. M. E. Sadler.

NOTES.

DR. A. SMITH WOODWARD will exhibit the new model of the Piltdown skull at the conversazione of the Geologists' Association, to be held on November 6 at University College.

A DESTRUCTIVE earthquake occurred in Asia Minor on October 3, of which brief reports were published shortly afterwards. Fuller accounts have now arrived by letter. The epicentre was in the neighbourhood of Burdur and Isbarta, the chief manufacturing towns of the district. It is stated that both these towns, which lie about 165 and 185 miles east-south-east of Smyrna, are completely ruined. The line of the Ottoman railway from Smyrna to Aidin was damaged, but less seriously than was at first supposed, for through running was resumed in less than twenty-four hours.

THE Paris correspondent of the *Morning Post* says that a committee of representatives of leading learned societies has been formed in Paris to consider the position of German and Austrian men of science and letters who have been admitted fellows of these societies in France. Since the beginning of the war there has been a movement in favour of the removal of all such fellows from the ranks of the societies to which they have been admitted in recognition of the value of the original work done by them, and on October 19 the Académie des Sciences held a meeting *in camera* to consider its position in the matter.

AMONG the results of the war will be noticed the obliteration of a large part of the usual weather information over land and sea. In the meteorological charts of the North Atlantic Ocean for November, issued by the Meteorological Office, this is particularly noticeable, and the U.S. Weather Bureau has pointed out that its useful charts of the northern hemisphere have had to be discontinued temporarily. The chart for November above referred to states that under normal conditions the North Atlantic is free from fog in that month, with the exception of a narrow zone between Cape Cod (Providence, U.S.), and Ushant, but that even in the fog zone the frequency is not more than 5, as compared with 40 per cent. in July.

At the annual meeting of the Royal Society of Edinburgh, held on October 26, the following officers were elected:—*President*, Prof. J. Geikie; *Vice-Presidents*, Prof. T. Hudson Beare, Prof. F. O. Bower, Sir Thomas R. Fraser, Dr. B. N. Peach, Prof. Sir E. A. Schäfer, and Right Hon. Sir J. H. A. Macdonald; *General Secretary*, Dr. C. G. Knott; *Secretaries to Ordinary Meetings*, Dr. R. Kidston, Prof. Arthur Robinson; *Treasurer*, Mr. J. Currie; *Curator of Library*

and Museum, Dr. J. S. Black; *Ordinary Members of Council*, Dr. J. G. Gray, Prof. R. A. Sampson, Prof. D'Arcy W. Thompson, Prof. E. T. Whittaker, Principal A. P. Laurie, Prof. J. Graham Kerr, Dr. L. Dobbin, Dr. E. M. Wedderburn, Dr. W. B. Blaikie, Dr. J. Horne, Dr. R. S. MacDougall, and Dr. W. A. Tait.

THE exhibition at the Royal Photographic Society's house (35 Russell Square) of Mr. Lewis Balfour's photographs of "Bird Life on the Bass Rock," is well worthy of a visit by all those who are interested in either the birds or the photography of birds. We believe that Mr. Balfour's special aim in the work was to illustrate the life-history of the gannet. After general views of the rookeries on the rock there follow on a large scale some pairs of gannets on nests, and a series of the young bird chipping its way out of the shell until it is fully hatched out. The growth and progress of the bird is shown almost day by day up to the fourteenth day, and then at frequent intervals up to the twelfth week, when it is ready for flight. Immature birds of their second, third, fourth, and fifth year's growth are shown with adults, and in various attitudes, such as enraged, fighting, carrying sea-weed, flying, arriving at the nest, and so on. These constitute about three-quarters of the whole number of the photographs, the remainder being similar but smaller series, showing black-backed, herring, and kittiwake gulls, guillemots, and puffins. The photography is almost uniformly excellent, the details of the birds showing crisp and clear. The exhibition closes on November 28.

IN addition to the awards announced in April for papers read at meetings of the Institution of Civil Engineers, the council has made the following awards for papers published in the Proceedings without discussion during the session 1913-14:—A Telford gold medal to Mr. J. V. Davies (New York); Telford premiums to Messrs. W. C. Popplewell (Manchester), A. J. Knowles (Cairo), H. Gaskell, jun. (Widnes), P. Rothera (Trichinopoly); the Crampton prize to Mr. H. F. Carew-Gibson (London); and the Manby premium to Mr. W. M. Griffith (Bareilly, India). The Webb prize for the best paper on railway machinery published during the past three years has been awarded to Mr. Henry Fowler (Derby), and the Indian premium for 1914 to Mr. P. Rothera (Trichinopoly). The council has made the following awards in respect of students' papers read during the session 1913-14:—The "James Forrest" medal and a Miller prize to Mr. J. E. Swindlehurst (Birmingham); and Miller prizes to Messrs. T. C. Grisenthwaite (Glasgow), H. J. C. Harper (Bristol), W. P. Nevett (Birmingham), J. M. L. Bogle (Manchester), E. A. Cross (Birmingham), S. Brassey-Edwards (Manchester), G. T. Cotterell (Bristol), D. D. Stanier (Newcastle), W. E. Gurry (London), H. Taylor (Birmingham), and R. C. Ratray (Manchester).

IN *Man* for October, 1914, Mr. A. L. Lewis discusses the standing stones and stone circles of Yorkshire. No dolmens or large non-sepulchral circles seem to be found in the county, but there are numerous

so-called "barrow circles," that is, small circles of stones surrounding tumuli. Many of these have been destroyed, and it is difficult to find those which survive amid the heather of the moors. On the other hand, Yorkshire possesses some very remarkable menhirs, or standing stones, which may be said to form a class by themselves. The longest standing stone in the British Isles is that in the churchyard at Rudstone, near Bridlington, which, so far as excavations have been made, is 40 ft. in height. It faces the line of May-day summer or thereabouts, and it is a mass of coarse ragstone or millstone grit, the place of origin of which is uncertain.

IN the *Philippine Journal of Science* for April Mr. E. B. Christie discusses the question of irrigation in Ilocos Norte province. It is carried out by a system of co-operative societies, and the procedure at the digging of a canal is a curious blend of Christian and pagan observances. Most of these societies are under the patronage of a saint, and they hold an annual festival at the conclusion of the harvest season. A mass is sung before the ceremony, and food and drink are laid out for the spirits. When the site for a new canal is selected, a cross is erected. Means are then taken to propitiate the local spirits, presumably because they are supposed to be offended by the disturbance of the soil. Omens are taken to fix a lucky time for the rite. Offerings of a coconut, a chicken, tobacco, and spirituous liquor are laid on an altar. Then an animal, a pig, or an ox is sacrificed near the trench, into which the blood is allowed to drip, with the invocation: "Ditch, this blood is spurted into you in order that the current may be as strong as the current of this blood." The body of the victim is then dragged along the bed of the canal as far as the plot of ground which is to be irrigated. Sometimes a dog is killed and its blood is sprinkled on a plot of ground which is to be levelled to form a rice-field, the dog being eaten afterwards. Animal victims are also said to be buried in the masonry of the canal intakes or gates—a good example of the foundation sacrifice which has been described by Sir E. Tylor.

At the end of the long systematic excavation work conducted by Mr. W. Pengelly in Kent's Cavern, Torquay, there were great quantities of the cave deposits left undisturbed. A little similar work has since been done there which has led to the discovery of other chambers and passages, and the finding of many more of the usual kind of cavern relics. Recently more persistent excavation has been made by Mr. C. Cox, who three years ago went to reside near the cavern. Becoming greatly interested in it and its history, he gives all the time freely spared from his vocational needs to excavating and acting as voluntary guide to the cavern. He has worked out a new passage for some 60 ft., and has obtained numerous fine examples of the cavern products, including well-worked flint palæoliths, jaws, teeth, and other bones in great variety. A week or two ago while moving the earth of the floor of the sloping chamber near the entrance of a channel he intends to excavate, he found a tooth of more than usual interest, having an appearance which suggested

human origin. Local medical experience confirmed his conclusion that it is a front tooth of a human being. It is, however, imperfect, being split laterally; the inner portion with the extreme end of the root is missing, so that the specimen is really only the larger outer half of an incisor. Its length is 17 mm., width across the crown, 9 mm., and depth of the enamel face about the same measurement. The enamel edge projects beyond the inner surface, indicating a position in the upper jaw, and permits it being determined as a well-worn left upper human incisor. It may be noted in connection with this find that, occurring in the floor some 3 or 4 in. below the present surface, it would be recorded in the terms used by Pengelly as lying in the fifth-foot level of the cave earth, beneath some two or more feet of granular stalagmite that formed the original floor of the Sloping Chamber.

IN the September-October number of *Bird-Lore* Mr. L. A. Fuertes continues the record of his impressions of the notes of tropical birds, dealing in this instance with toucans (illustrated by a coloured plate), cuckoos, trogons, motmots, etc. From their loud and incessant cries, brilliant colouring, and large size, most of the members of the first-named group would, it might be thought, be extremely easy of detection. As a matter of fact, this is far from the case, the explanation, so far as coloration is concerned, being that the brilliant tints of the birds, inclusive of their great uncouth beaks, harmonise closely with those of the tropical vegetation, and the intervening rays of sunlight, amid which they perch.

NOWADAYS much of the work on mammals by American writers relates to races and so-called species of little or no general interest. An exception occurs in a paper on South American squirrels contributed by Dr. J. A. Allen to the *Bull. Amer. Mus. Nat. Hist.*, vol. xxxiii., pp. 585-597, in which will be found the description of a new generic type (*Notiosciurus rhoadsi*) from the Andes of Ecuador, distinguished from other tree-squirrels by the structure of the hind feet. In those of other species the greater portion of the sole is bare, with the toe-pads separate, and widely sundered from the narrow heel-pad. In the new form, on the other hand, the bare area is restricted to a small patch immediately behind the toes, with the toe-pads crowded together, and the heel-pad, which occupies nearly the whole width of the foot, in close apposition.

THE ecology of local fresh-water fishes forms the subject of an interesting illustrated article by Dr. S. A. Forbes, published as a pamphlet by the Illinois State Laboratory of Natural History. Difference in habitat and food forms a basis for grouping fresh-water fishes, although, as the author acknowledges, no hard-and-fast lines of division can be drawn from these. Very noteworthy is the fact that one of the largest American species, the spoon-beaked sturgeon (*Polyodon spathula*), is almost the only one which feeds on plankton when adult, although this constitutes the diet of practically all species in their infantile condition. Some kinds pass directly from this to the permanent food-stage, but in the sheep's-head (*Haplodinetus grunniens*) there is an intermediate in-

sectivorous stage between the infantile plankton-phase and the permanent mollusc-crushing habit

To the October number of the *Zoologist* Mr. J. C. Moulton, curator of the Sarawak Museum, contributes an account of a collecting expedition in the Sarawak province of Borneo, in which he followed to a great extent the route taken by Dr. Wallace more than half a century ago. In the Sadong district, where the great naturalist often saw three or four in a day, orang-utans are now much scarcer than in Wallace's day, despite the fact that they are protected by Government, except when, as occasionally happens, one of them takes to raiding fruit-trees, when its destruction is permitted. Two photographs of groups of land-Dayaks are of considerable interest. These people—formerly persecuted by head-hunting sea-Dayaks—are the only tribe in Sarawak retaining customs indicative of Hindu influence, due, no doubt, to their Javanese origin.

SOME years ago the Indian Museum published the first part of "An Annotated List of the Asiatic Beetles in the Collection." More recent work, by Mr. H. Gravely, on the Passalidæ—a family nearly related to the Lucanidæ, or stag-beetles—showed that the continuation of a mere list of localities was, in the present state of our knowledge of that group, altogether insufficient, and that illustrated descriptions of all the Oriental species were urgently required. This led to an inquiry into the general principles adopted in the current classification of the family, which was found to require but little modification in order to render it satisfactory from a modern point of view. The result has been a monograph of 176 quarto pages, illustrated with three plates, of the Oriental members of the family, issued as No. 4 of vol. iii. of *Memoirs of the Indian Museum*. As remarked by the author, the figures of the heads of the various species will be of permanent value, even if some of the systematic portion of the work may require revision.

To the author, Mr. F. Cole, we are indebted for a copy of an article on the history of anatomical museums, reprinted from "A Miscellany: Presented to J. M. Mackay, LL.D." (Liverpool and London, 1914). In discussing the earlier museums, the author points out that these had to depend almost exclusively on desiccation and injection for the display of the anatomy of the soft parts, and that skill in making such preparations attained a development which in certain cases has never afterwards been equalled. Even after the introduction of alcohol as a preservative medium, the use, both of the spirit itself and of the glass vessels in which it is contained, was greatly restricted by their cost, the Hunterian Museum, which, in its founder's time, was unusually rich in moist preparations, having only 4829 of that type, as against 8636 not requiring fluid. The purely anatomical museum attained its zenith with John Hunter, whose collection, in the author's words, had no rivals and no imitators. "Modern ideals discover a narrower outlook, and a relaxing hold on anatomical verity. The museum of the present day is designed to illustrate, first the general principles of classification, and afterwards the elements of systematic anatomy."

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THE report of the Refrigeration Research Committee of the Institution of Mechanical Engineers was presented at the meeting of the institution on October 16. With regard to the rating of refrigerating machines, it recommends that the refrigeration be expressed in (kilogram) calories per second, that the standard conditions be, for the cooling water, 15° C., at inlet to 20° C. at outlet, for the cooled material, 0° C. to -5° C., the temperatures being those of steady working; the refrigeration produced under these conditions to be called the "rated capacity" of the machine. The coefficient of actual performance is the ratio of the refrigeration to the work spent in driving, that of ideal performance the ratio of the refrigeration to the work spent in an ideal adiabatic cycle with the same initial and final temperatures and pressures. The quotient of the two performances is to be the "relative efficiency." The report contains entropy-total heat charts for carbonic acid, ammonia, and sulphurous acid, the last two being provisional only. The chairman, Sir A. Ewing, has added an appendix showing the great convenience of the entropy-total heat charts as compared with the entropy-temperature charts in calculations respecting refrigerating machines.

VOL. XI. of the *Collected Researches of the National Physical Laboratory* consists of reprints of fourteen memoirs by the staff of the institution, which have appeared recently in the *Proceedings of scientific societies* or in the *technical Press*, and extend to more than 300 pages. Some idea of the importance of the work carried out at the laboratory may be formed by noting a few of the conclusions to which the authors of these memoirs have arrived in the course of their investigations. Mr. F. E. Smith finds the value of the ohm by his modification of the method of Lorenz slightly less than it has been taken in the past—106.25 instead of 106.30 cm. of mercury. Drs. Harker and Kaye conclude that when a heated metal vaporises it sends out, in addition to the ordinary uncharged metallic particles, electrically charged particles which are shot out at right angles to the metallic surface and produce electric currents of the order of an ampere. Dr. Rosenhain and his staff show that there is a transition point for iron about 900° C., and provide further evidence in support of the theory of the existence of an amorphous cement between the crystals of metallic substances. Mr. Paterson and his colleagues prove that the electrometer must be given a place amongst the instruments suitable for standard measurements in electrical engineering. Dr. Stanton shows how inadequate are the accepted formulæ for the flow of viscous liquids through pipes to represent the actual facts, and Mr. Baker gives the results of his investigation of the effects of the lengths and shapes of bow and stern portions of mercantile ships on the resistance at various speeds. It is to be hoped that the national importance of work of this type will not be overlooked even in such times as the present.

Engineering for October 23 contains an illustrated account of the United States Fleet collier, *Jupiter*, which is of special interest at the present time in view of the importance of the rapid recoaling of war-

ships. The ship is of the twin-screw, single-deck type, and is designed for a speed of 14 knots when at a loaded displacement of 19,230 tons. In addition to having interesting equipment for the handling of coal and oil fuel, the vessel is notable, as the propellers are driven by electric motors, current being supplied to these by turbine-driven generators, the shaft-horsepower available for propulsion being 5500. The total cargo capacity is 966,260 gallons of oil and 9856 tons of coal, or, alternatively, 405,620 gallons of oil and 11,380 tons of coal. The coal handling gear was supplied by the Mead Morrison Manufacturing Company, and the stipulation of the contract was for the delivery of 100 tons per bucket per hour when the gear was operated by winchmen of one week's experience. Owing to the large number of towers supporting the booms and rigging of the coal handling plant, the appearance of the vessel is somewhat unusual.

THE *Scientific American* for October 3 draws a contrast between the ordinary European frontier with its enormous forts and lines of strategic railways, and the Canadian frontier. On the continent of America, the two greatest nations of the world have a common frontier which extends, unbroken, for some 4000 miles. Throughout the whole of this frontier there is not to be found, on either side, a single fortification, or any offensive or defensive military work of any kind whatsoever, and this is the case despite the facts that this far-flung frontier was the eventual outcome of a fierce war, and that these two powerful nations have always been engaged in keen commercial rivalry. That heavily fortified frontiers, backed by military railways, are a menace to a friendly neighbouring State, and provocative of responsive military works, and that they produce an atmosphere of international suspicion and dislike cannot be disputed. There is a growing conviction that the failure of the Teutonic attempt to establish a military dictatorship in Europe will be followed by the final subjugation and control of militarism. Our contemporary can think of no guarantee that would be more effective than the complete obliteration of these fortifications, modern in construction, but essentially medieval in conception, which disfigure European frontiers.

MESSRS. JOHN BARTHOLOMEW AND CO., of the Geographical Institute, Edinburgh, have published a new reduced survey map of north-eastern France, Belgium, and the Rhine. The map is coloured orographically, and is on the scale of sixteen miles to an inch. This scale makes it possible to show with clearness the railways, fortresses, main and secondary roads, and frontier custom-houses. Heights are given both in metres and feet, and the distances between road junctions are marked. The price of the map is 2s. on paper, and 3s. mounted on cloth.

THE following forthcoming books of scientific interest are announced by *Messrs. G. Bell and Sons, Ltd.*:—*X-Rays and Crystal Structure*, by Prof. W. H. Bragg; *Quantitative Laws in Biological Chemistry*, by Prof. Svante Arrhenius; *Tuberculosis: a General Account of the Disease, its Treatment, and Prevention*, by Dr. A. J. Jex-Blake; *Woollen and Worsted Cloth*

Manufacture, by Prof. R. Beaumont, illustrated; *Buddhist Psychology*, by Mrs. Rhys Davids. The list of *Messrs. Methuen and Co., Ltd.*, includes:—*My Life*, by Sir Hiram S. Maxim; *On Alpine Heights and British Craggs*, by G. D. Abraham, illustrated; *How to Know the Ferns*, by S. L. Bastin, illustrated; *British Insects and How to Know Them*, by H. Bastin, illustrated; *The Mammary Apparatus of the Mammalia in the Light of Protogenesis and Phylogenesis*, by Prof. E. Bresslau, illustrated; *Mind Cures*, by G. Rhodes; and the following first volumes of *Methuen's Health Series*:—*The Eyes of Our Children*, by N. B. Harman; *Throat and Ear Troubles*, by M. Yearsley; *The Teeth*, by A. T. Pitts; *The Care of the body* by Dr. F. Cavanagh; *The Health of a Woman*, by Dr. H. J. F. Simson; *Health for the Middle-Aged*, by Dr. S. Taylor; *The Prevention of the Common Cold*, by Dr. O. K. Williamson; and *The Hygiene of the Skin*, by Dr. G. Pernet.

OUR ASTRONOMICAL COLUMN.

THE ROTATION PERIODS OF TWO OF SATURN'S SATELLITES.—In the *Bulletin* (No. 64) of the Lowell Observatory Prof. Lowell and Mr. Slipher publish their observations in relation to two of the satellites of Saturn, namely, Mimas and Enceladus, which have led them to deduce that the revolutions and axial rotations of these bodies are synchronous. This investigation on the brilliancy of these satellites was carried out in December, 1913, and the first three months of the present year, and resulted in finding out that these bodies are of very unequal albedo in different parts of their apparent orbits, and the variations recur *in situ* showing that the satellites always turn the same face to their primary. Both the moons appear brightest near their western elongations and faintest near their eastern. Their magnitudes and ranges are given as follows:—Mimas, 12.90 to 13.33; Enceladus, 12.33 to 12.67. Both these bodies are too small to show a disc, so their size has been inferred from their brilliancy relative to Tethys. Two figures accompany the text, in which the observations are plotted diagrammatically.

DIFFERENCE OF LONGITUDE BETWEEN PARIS AND NICE.—In a communication by M. B. Jekhowsky, presented to the Paris Academy of Sciences (*Comptes rendus*, vol. clix., No. 15, October 12) by M. P. Appell, a brief summary is given of the determination of the difference of longitude between Paris and Nice. The astronomical observations have been made at both these stations with the "modèle géodésique de l'astrolabe a prisme," by the eye and ear method, and the chronometric comparisons were made by wireless after the method of MM. A. Claude, G. Ferrié, and L. Driencourt. The chronometer rates were controlled both before and after the astronomical observations by pendulums, and comparisons were made at the beginning and end of each series of observations. The daily wireless time signals from the Eiffel Tower were utilised as a check on Paris and Nice chronometers between the two series of evening observations. The observations were made on the evenings of May 3, 6, 31, and June 5, and the final result of the difference of longitude between Paris and Nice is given as oh. 19m. 51.204s. $\pm 0.06s$.

EFFECT OF HUMIDITY ON PHOTOGRAPHIC PLATES.—It has been previously pointed out that when a photographic plate has been exposed in a telescope for some time the plate gradually loses some of its sensitiveness.